

REMARKS

The Office Action dated June 23, 2003 has been received and carefully noted. The above amendments to the claims, and the following remarks are submitted as a full and complete response thereto. Claims 1-38 are pending in this application. Claims 1, 14, and 27 are amended. No new matter is presented. In the outstanding Office Action, claims 1-38 are rejected under 35 U.S.C. §103(a). In view of the above amendments and the following remarks, Applicants request the favorable consideration of claims 1-38.

35 U.S.C. 103(a)

Claims were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shikama (U.S. Patent No. 5,285,287) in view of Suzuki et al. (U.S. Patent No. 6,379,010). The Office Action takes the position that Shikama teaches or suggests all the features recited in the rejected claims except a polarization direction of at least one color component out of the image light irradiated on the screen, parallel to a vertical cross section of the screen, parallel to a horizontal cross section of the screen, parallel to a plane including the image light irradiated on the screen and a normal of the screen. The Office Action utilizes Suzuki to teach and/or suggest these features. Applicants respectfully disagree with the Office Action and submit that the claims 1-8, 11, 13-21, 24, 26-33, and 38 recite subject matter that is neither taught nor suggested by the applied references.

Claim 1 is directed to a rear projection display device comprising a light source lamp, color splitting means, a plurality of liquid crystal panels, color synthesizing means, and projection means. The color splitting means splits the light emitted from the light source lamp into a plurality of color components. The plurality of liquid crystal panels optically modulates each color light split by the color splitting means. The color synthesizing means synthesizes each of the color light modulated by the liquid crystal panels. The projection means projects an image light which is color-synthesized by the color synthesizing means on a screen from slantly above or slantly below. The polarization direction of at least one color component out of the image light irradiated on the screen is parallel to a vertical cross section of the screen. The polarization direction of the at least one color component, surface shape of the screen, and the image light are manipulated to

increase image quality.

Claim 14 is directed to a rear projection display device comprising a light source lamp, color splitting means, a plurality of liquid crystal panels, color synthesizing means, and projection means. The color splitting means splits light emitted from the light source lamp into a plurality of color components. The plurality of liquid crystal panels optically modulates each color light split by the color splitting means. The color synthesizing means synthesizes each of the color light modulated by the liquid crystal panels. The projection means projects the image light, which is color-synthesized by the color synthesizing means on a screen from a slant side. The polarization direction of at least one color component out of the image light irradiated on the screen is parallel to a horizontal cross section of the screen. The polarization direction of the at least one color component, surface shape of the screen and the image light are manipulated to increase image quality.

Claim 27 is directed to a rear projection display device comprising a light source lamp, color splitting means, a plurality of liquid crystal panels, color synthesizing means, and projection means. The color splitting means splits light emitted from the light source lamp into a plurality of color components. The plurality of liquid crystal panels optically modulates each color light split by the color splitting means. The color synthesizing means synthesizes each of the color light modulated by the liquid crystal panels. The projection means projects the image light in a slant, which is color-synthesized by the color synthesizing means on a screen. The polarization direction of at least one color component out of the image light irradiated on the screen is parallel to a plane including the image light irradiated on the screen and a normal of the screen. The polarization direction of the at least one color component, surface shape of the screen and the image light are manipulated to increase image quality.

The present invention is directed to a rear projection display device, which enables an observer to observe a picture on the front surface of a screen by projecting image light onto the back surface of the screen from a slant. The present invention provides a rear projection device capable of improving the brightness and the image quality of the picture by improving the utilization efficiency of the image light, which is projected onto the screen from a slanted angle.

It is respectfully submitted that the cited references fail to disclose or suggest at

least the elements of “a polarization direction of at least one color component out of the image light irradiated on the screen: parallel to a vertical cross section of the screen; parallel to a horizontal cross section of the screen; parallel to a plane including the image light irradiated on the screen and a normal of the screen” as recited in the presently pending claims. The cited references also fail to teach and/or suggest that the polarization direction of the at least one color component, surface shape of the screen and the image light are manipulated to increase image quality. Thus, the cited references fail to teach and/or suggest all the features of the claimed invention and, therefore fail to provide the advantages of the present invention.

Shikama is directed to a projecting display device that is selectively operative in a front projection mode and a rear projection mode. Specifically, Shikama discloses a projector 300 comprising a light source 1 with lamp 120 and parabolic mirror 130 that directs white light toward dichroic mirrors 14B and 14G. The projector 300 also comprises mirrors 11A, 11B and 11C, liquid crystal display panels 3R, 3G and 3B, a dichroic prism 15, a projection lens 4, and a reflecting, front projection screen 5F. The mirrors 11A and 11B reflect red light, the dichroic mirror 14B and the mirror 11C reflect blue light, and the dichroic mirror 14G reflects green light. The reflected light is directed to the respective one of the liquid crystal display panel 3R, 3G and 3B, each of which produces a monochromatic image of the respective color under control of an operating circuit.

Suzuki discloses a projection type display using a transmission type liquid crystal light valve, capable of exhibiting a high quality gradation display by preventing a leak current at a switching device. Suzuki discloses three liquid crystal light valves which have polarizing plates that are modulated in intensity and emit each light of color components red, green and blue, and a dichroic prism to synthesize exiting lights from the respective light valves. The projection type display is also structured to arrange half-wave plates between the liquid crystal light valves to set a polarizing direction of an exiting light of a blue component orthogonal to polarizing directions of the other two existing lights. Suzuki also discloses that each light of the three primary colors has a polarizing direction that is parallel and is incident on the dichroic prism after being incident on each of the liquid crystal light valves and corresponding to each color and modulated corresponding to the image signal.

Applicants respectfully submit that each and every element recited within claims 1, 14 and 27 of the present application is neither disclosed nor suggested by Shikama and/or Suzuki, taken alone or in combination. Specifically, it is submitted that neither Shikama nor Suzuki, taken alone or in combination, disclose or suggest at least the limitations of a polarization direction of at least one color component out of the image light irradiated on the screen: parallel to a vertical cross section of the screen; parallel to a horizontal cross section of the screen; parallel to a plane including the image light irradiated on the screen and a normal of the screen. Furthermore, the cited references fail to teach and/or suggest the polarization direction of the at least one color component, surface shape of the screen and the image light being manipulated to increase image quality.

The present Invention utilizes the reflectivity characteristics of P and S polarized light on both the light incident surface and the light-emitting surface of the fresnel lens of the screen. In contrast, Suzuki is directed to a projection type display using a transmission type liquid crystal light valve capable of exhibiting a high quality gradation display by preventing a leak current at a switching device. Suzuki discloses that the reflectivity characteristics of the P and S polarized light are only taken into consideration with regard to the back surface of the freshnel lens of the screen at the light incident side. The other surface of the fresnel lens, which is the light emitting side is not taken into consideration.

Contrary to the teachings of cited references, the claimed invention takes into consideration the reflectivity characteristics of the P and S polarized light on both the light incident surface 71A and the light emitting surface 71B of the freshnel lens of the screen. As a result, the claimed invention provides the benefit of adjusting the polarization direction, the blaze angles of the freshnel lens and the range and conditions of the angle of light incident to the screen in order to increase the image quality. Accordingly, the cited references fail to teach and/or suggest the polarization direction of the at least one color component, surface shape of the screen and the image light being manipulated to increase image quality. Therefore, Applicants submit that the present invention is novel and non-obvious to an ordinary person skilled in the art, and therefore is patentable over the cited references. Accordingly, Applicants respectfully request the withdrawal of the rejection of claims 1, 14, and 27 under 37 U.S.C. 103(a).

Claims 2-8, 11-21, 24, 26-33, 36 and 38, are dependent upon claims 1, 14, and 27,

respectively. Applicants respectfully submit that each of claims 2-8, 11-21, 24, 26-33, 36 and 38 recite subject matter which is neither disclosed nor suggested by Shikama and/or Suzuki, for at least the reasons set forth above with respect to claims 1, 14 and 27. Therefore, Applicants request the withdrawal of the rejection of claims 2-8, 11-21, 24, 26-33, 36, and 38 under 35 U.S.C. 103(a).

Claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shikama in view of Suzuki as applied to claims 1-8, 11, 13-21, 24, 26-33, 36 and 38 and further in view of Shibazaki (U.S. Patent No. 5,477,394). Applicants respectfully traverse this rejection and submit that each of claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 recites subject matter, which is neither disclosed nor suggested in the cited prior art.

Shibazaki discloses a projector comprising a light valve, a converging lens, a plane mirror, an elliptical mirror, a projection lens and a parabolic mirror. Shibazaki also discloses a Fresnel lens and a lenticular lens-screen. The elliptical mirror of Shibazaki has a primary focal point and a secondary focal point that is also a focal point of the parabolic mirror.

However, Shibazaki fails to disclose and/or suggest a polarization direction of at least one color component out of the image light irradiated on the screen: parallel to a vertical cross section of the screen; parallel to a horizontal cross section of the screen; parallel to a plane including the image light irradiated on the screen and a normal of the screen. Shibazaki also fails to teach and/or suggest that the polarization direction of the at least one color component, surface shape of the screen and the image light are manipulated to increase image quality. Therefore Shibazaki fails to cure the deficiencies which exist in the combination of Shikama and Suzuki.

Accordingly, Applicants respectfully submit that each and every element recited within each of claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 is neither disclosed nor suggested by the combination of Shikama, Suzuki, and Shibazaki. In particular, claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 depend from independent claims 1, 14 and 27. Applicants respectfully submit that each of claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 also recite subject matter which is neither disclosed nor suggested by Shikama, Suzuki and/or Shibazaki, for at least the reasons set forth above with respect to claims 1, 14 and 27.

Accordingly, Applicants request the withdrawal of the rejection of claims 9, 10, 12, 22, 23, 25, 34, 35 and 37 under 35 U.S.C. 103(a).

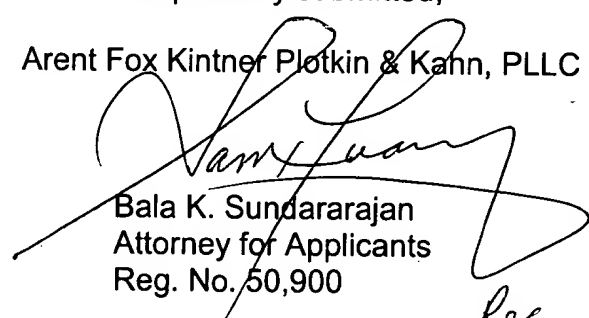
In view of the above amendments and remarks, Applicants respectfully submit that claims 1-38 each recites subject matter that is neither disclosed nor suggested in the cited references. Claims 1, 14, and 27 are amended. No new matter is presented. Accordingly, Applicants submit that the application is now in condition for allowance with claims 1-38 contained therein.

Should the Examiner believe the application is not in condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, Applicants respectfully petition for an appropriate extension of time. The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300, referencing Attorney Client Matter No. 107336-00005.

Respectfully submitted,

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